Solar Eye User Manual

Edition <1.1>

JIANGSU EVER-SOLAR NEW ENERGY CO., LTD.

Revision History

Date	Edition	Specification
17/08/2011	1.0	Create File
02/09/2011	1.1	Add Micro SD function description

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1. Introductions

Solar Eye is desktop monitoring device, developed for home and small commercial PV solar system. This device is able to monitor up to 5 inverters simultaneously, transfer data through wireless network and display relevant data on the LCD.

Features：

- Integrated Large LCD display
- Multiple display - Graph or bar chart display options
- Wireless Technology (Up to 150 meter in open area and up to 100 meter in building)
- Retro fit on any Ever-solar inverter, monitor up to 5 inverters
- Micro SD card storage for history monitoring data
- Real time monitoring of Power Generation, Export value and Carbon Saving

1.1 Packing List

The packing list of Solar Eye as below:

A

B

C

D

E

F

G

H

I

J

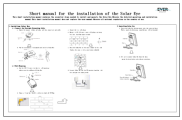
K

Table 1-1 Packaging List

Location	Quantity	Name	Purpose
A	1	Solar Eye	Display terminal of inverter data
B	1	Solar Bee	Collect inverter data
C	1	Waterproof Seal Sets	Secure water and dust protection of Solar Bee (IP65)
D	1	Operating& Installation Instruction	Product operating & installation instruction
E	4	wall plug	For Solar Bee wall mounting
F	2	Screw ST2.7×6	Fix the suspension loop to Solar Bee
G	2	Solar Bee Suspension Loop	For Solar Bee wall mounting
H	1	The base of Solar Eye	For Solar Eye installation on the table
I	4	Screw ST3×25	For Solar Bee & Solar Eye wall mounting

J	1	Direct network	Cable between Solar Bee & inverter
K	1	Quick installation guide of Solar Eye	Product quick installation guide

1.2 Safety and Notes

1）Read the instructions before installation
2）Disconnect inverter power before installing Solar Bee
3）If the product is damaged, please contact your local maintenance center or return to the dealers/distributors for repair
4）Please do NOT try to open the Solar Eye and Solar Bee, or force it in any way as it will VOID your warranty and we will not be able to exchange it
5）Please do not put Solar Eye in the water or any other liquids.
6）Please do not place Solar Eye near heat or flame, or any place with high humidity or low temperature
7）Please handle the product carefully
9）Please keep the product away from children
10）Please use the product under the environment with temperature ranging from -20℃ to 50℃, and relative humidity ≤ 80%
11）When Solar Eye is not in use for a long time, please remove the battery or cut off the power.

2. Product Installation

The installation process includes the installation of Solar Bee and Solar Eye. Please follow below steps.

2.1 Connecting Solar Bee and Straight Networking Cable

1) Please remove the square silica gel plug, and then insert network cable, as shown in Fig2-1

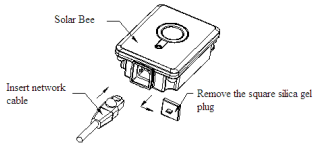

Fig 2-1 Insert network cable

Attention: Connection cable is standard CAT5 network cable with RJ45 connectors, CAT5, CAT5E is compatible.

2) Fix the accessories (waterproof seal sets) to Solar Bee, as shown in Fig 2-2

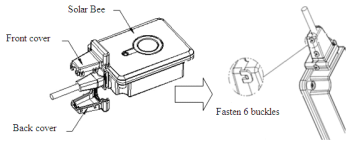

Fig 2-2 Installation of waterproof seal sets

2.2 Solar Bee Wall Attach Installation

1) Use the ST2.7*6 screws to fix two suspension loops onto the pillars of Solar Bee. Fig 2-3 as below

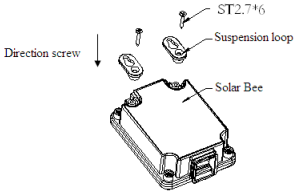

Fig 2-3 Suspension loop installation

2) Drill twoφ6 holes on the wall with 39mm space distance as Fig 2-4

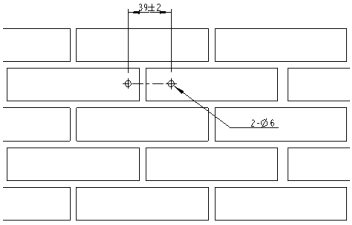

Fig 2-4 Drill the wall mounting holes

Attention: Hold the handgrip tightly; keep right direction, no shaking to prevent the damages to the wall and bias of the holes. The depth of holes must more than 30mm. Please keep the surface clean before measurement.

3) Use the rubber hammer to tap wall plugs into the holes.

4) Wring two ST3×25 screws into wall plugs, and keep the screw head 5mm space outside. Fig 2-5 as below

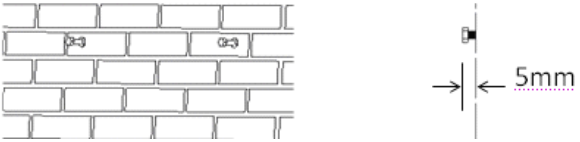

Fig 2-5 Fix screws

5) Hang the Solar Bee on the screws fixed to the wall. Tighten the screw with a screwdriver slightly. Fig 2-6 as below

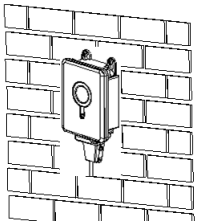

Fig2-6 Install Solar Bee

6) Connect Solar Bee and the PV inverter together with the straight networking cable. Fig 2-7 as below

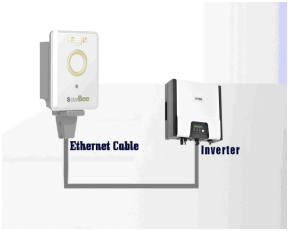

Fig 2-7Connect inverter and Solar Bee

2.3 SD Card (Optional) in Solar Eye and Battery Installation

Solar Eye adopts SD card (compatible up to 4GB). Users is able to upgrade Solar Eye Firmware through SD card.

1）Open the battery cover of Solar Eye. Fig 2-8 as below

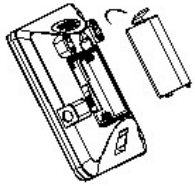

Fig 2-8 Open battery cover

2）Put SD card into the slot, then lock the MICRO SD card clamping plate. Fig 2-9 as below

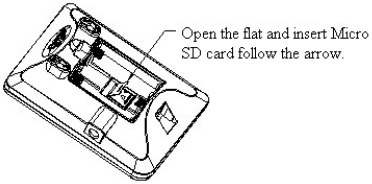

Fig 2-9 Insert SD card

3）Put three pieces AA alkaline battery into battery box following the + - marks as Fig 2-10.

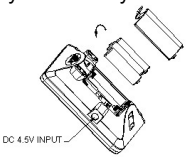

Fig2-10 Battery loading

Warning: Make sure the battery polarity. The product also could be powered by 4.5V DC adapter showing in the Fig 2-10.

2.4 Solar Eye Installation

There are two ways for Solar Eye installation: one is on the removable base, the other way is wall mounting.

2.4.1 Detachable Chassis Fixation

Press the Solar Eye bottom groove into the convex of base. With a sound of clattering, installation will be finished. Fig 2-11 as below:

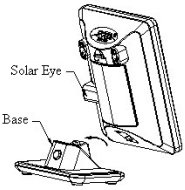

Fig 2-11 Solar Eye base setting

If want to remove Solar Eye from the base, press the base button and release connection. Fig 2-12 as below:

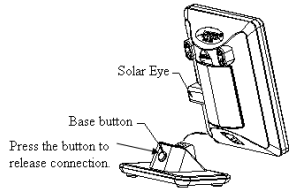

Fig2-12 Remove Solar Eye from base

Warning: When remove the base, there should be no force in case of mechanical damage.

2.4.2 Wall Mounting

1）Drill two φ6 holes with 43mm space distance. Fig 2-13 as below:

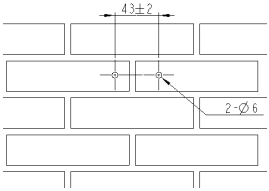

Fig 2-13　Drill the wall mounting holes

Warning: Stay vertical angle between driller and wall with no shake in case of incline. The hole should be no less than 30mm deep. When measure the hole depth, clear the dust inside.

2）Place the wall plugs into the holes with the rubber hammer.

3）Wring the screws ST3×25 into wall plugs, and keep the screw head 5mm space outside. Fig 2-14 as below:

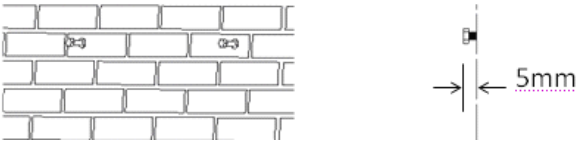

Fig 2-14 Fix screws

4）Hook the Solar Eye over the two screw nails. Fig 2-15 as below:

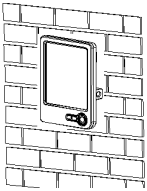

Fig 2-15 Hook Solar Eye on the wall

3.　Interface Introduction

3.1 Main Interface

Solar Eye main interface as Fig 3-1:

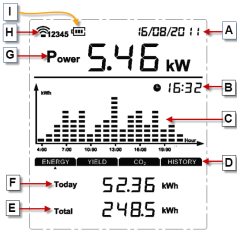

Fig 3-1 Solar Eye main interface

Table 3-1 Fig3-1 Description

Pos. Fig 3-1	Description
A	Date
B	Time
C	Power trend
D	Sub menu
E	Gross generation
F	Intraday generation
G	Current generated power
H	Connected inverter quantity
I	Battery display(when battery power shortage happens, it will twinkle)

3.2 Sub Interface

Under main interface, press “enter” key to switch among ENERGY, YIELD, CO2 and HISTORY interfaces.

1）ENERGY interface：display E-today & E-total as Fig 3-2

Fig 3-2 ENERGY Interface

2）YIELD interface：display E-today yield & E-total yield as Fig 3-3

Fig 3-3 YIELD Interface

3）CO2 interface：display CO2 emission volume today and in total as Fig3-4

Fig 3-4 CO2 Interface

4）HISTORY interface：display hourly, daily, weekly, monthly and yearly generated electricity as Fig 3-5. For details, pls refer to chapter “4.6 history energy and power value yield view”.

Fig 3-5 HISTORY Interface

4. Set & Operation

Three keys “left” (C), “right” (B), and “enter” (A) are available as Fig 4-1, which can help achieve all functions.

Fig 4-1 Key Guide

4.1 Initial Setting

Initial setup is required for first time use. Users are allowed to change these parameters as following:

4.1.1 Set Time

Hold “Enter” key for 3 seconds for setting as Fig 4-2. At this interface, press “left” & “right” key to change time, and switch to the next setting by “enter” key. All time & dates will flash to indicate the setting is finished; at this time, press “right” key to enter into currency setting interface.

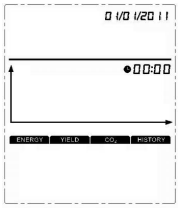

Fig 4-2 Set Time

4.1.2 Set Currency

Currency setting interface is as Fig 4-3. Press “left” & “right” key to switch among “€、£、$、¥” and then choose the target one by “enter” key. When it’s finished, press “right” key to enter into yield coefficient setting interface.

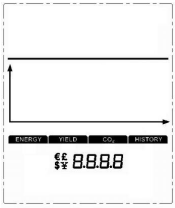

Fig 4-3 Set Currency

4.1.3 Set Yield Coefficient

Yield coefficient indicates the yield per 1Kwh electricity generated from PV inverter and its setting interface is as Fig 4-4. Press “left” & “right” key to change coefficient, and then confirm it by “enter” key. All digits flash to indicate the setting is finished. At this time, press “right” key enter into emission coefficient setting interface.

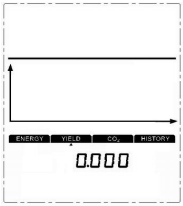

Fig 4-4 Set Yield Coefficient

4.1.4 Set Emission Coefficient

Emission Coefficient indicate the decreased CO2 volume (kg) per 1Kwh electricity generated from PV inverter and its setting interface is as Fig 4-5. “left” & “right” key to change coefficient, and then confirm it by “enter” key. All digits flash to indicate the setting is finished. At this time, press “right” key enter into main interface.

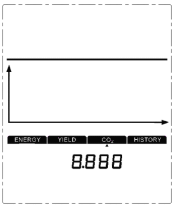

Fig 4-5 Set Emission Coefficient

4.2 Wireless Connection

Solar Eye can be connected to Ever-solar inverter (up to 5 inverters) as the following two ways.

4.2.1 Connection Type

Type 1：One Solar Eye connects to multiple Solar Bee as Fig 4-6.

Fig 4-6 one Solar Eye connects to several Solar Bee

Type 2：One Solar Eye connects to one Solar Bee, and then the Solar Bee connects to several pieces of inverters as Fig 4-7.

Fig 4-7 one Solar Eye connects to one Solar Bee

4.2.2 Set Up Wireless Connection

1) Press the key of Solar Bee under normal working state for 15 seconds, until LED of Solar Bee flashes, which indicates Solar Bee has been into connection state.
2) Press “right” key of Solar Eye to go into connection state as Fig 4-8. At this time, the channel Solar Bee stays in will show on top left corner on Solar Eye, and press “left” & “right” key to choose channels Solar Bee stays in. For example, icon indicates Solar Bee stays in channel 1.

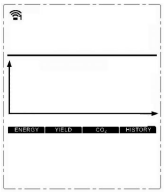

Fig 4-8 Wireless Connection Adjust

3) Press “Enter” button on the Solar Eye to connect, while symbol flashing, stop flashing after connection is ready, while LED is off. Solar Eye goes back to the main menu automatically after 1 minute.
4) Please repeat operation process above again if the connection failure,

One Solar Eye connects to several Solar Bee (up to 10); avoid to setting to same communication cannel.

4.3 Alarm Warning Setting

The alarm waning note user to deal with when inverter error happens, in the main menu, press and hold “left” and “right” buttons enter the interface of alarm warning setting, show as Fig 4-9. Press “left” and “right” to chose ON or OFF, then press “enter” button quit the interface to the main menu.

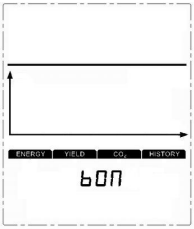

Fig 4-9 interface of alarm warning setting

Setting alarm “on”, solar-eye alarm warning every 5 minutes to note user when inverter error happens.

4.4 Data Storage Interval Time Setting

Data storage interval means the frequency of writing data to SD card. In the main menu, press and hold “left” button enter the interface of data storage interval. as show in “Fig 4-1”. User can choose the interval time from 1 to 5 minutes by pressing “left” or “right” buttons, Then press “enter” button go back to the main menu.

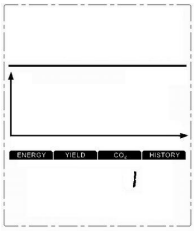

Fig 4-10 Interface of data storage interval

4.5 Restore Factory Default Settings

In the main menu, you press and hold both “left” and ”right” buttons, while switch on the power. LCD display in full screen, LED flash after 3 seconds, then device restore to default factory setting. After completion, device can be used again by switch on power.

Attention: history data will be lost if recover to factory default setting. therefore, copy the data in SD card before restore to factory default setting!

4.6 History Energy and Power Value Yield View

Call up HISTORY menu, you press “right” button to view history data by switching the unit of Y axis among “Hour”“Day”“Week”“Month” and “Year” by pressing “right” button. Operation process show as below:

1)**Hour**：Press “right” button, you can view the energy and power values/hour of last 34 hours yield by your PV system, Shown as in “Fig 3-1” “B” means the time you check, ”F” means energy and power values yield in this hour.
2)**Day**：Press “right” button, you can view the energy and power values/day of this day yield by your PV system, Shown as in “Fig 3-1” “A” means the data you check, ”F” means energy and power values yield in the day.
3)**Week**：Press “right” button, you can view the energy and power values/week of last 34 weeks yield by your PV system, Shown as in “Fig 3-1” “B” means the week you check, ”F” means energy and power values yield in this week.
4)**Month**：Press “right” button, you can view the energy and power values/month of last 34 months yield by your PV system. Shown as in “Fig 3-1” “A” means year you check, ”F” means energy and power values yield in this month.
5)**Year**：Press “right” button, you can view the energy and power values/year of last 4 years yield by your PV system. Shown as in “Fig 3-1” “A” means year you check, ”F” means energy and power values yield in this year.

4.7 Micro SD File Structure Description

Take out Micro SD from Solar Eye, insert into PC, and then you will see the file structure as

below:

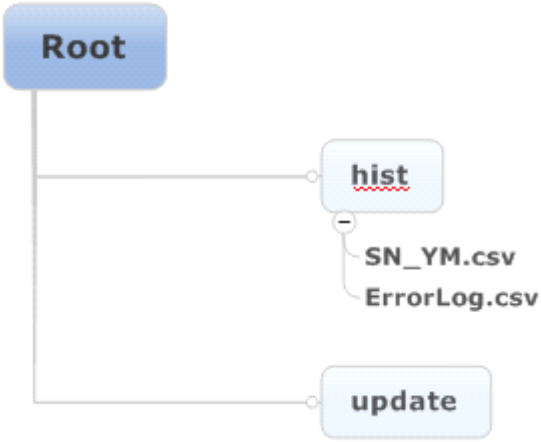

Fig 4-11 Micro SD Directory Structure

Table 4-1 file description

Name	Type	Description
hist	folder	Store files of history data & fault info
SN_YM.csv	file	Store working data of inverter, SN—serial number of inverter; YM—year/month
ErrorLog.csv	file	Store fault info of inverter
update	folder	Store software upgrading program, named as S-update.bin

4.8 Check the History Data

Solar Eye records all data of generated electricity and the user can review it as the following way:

■ Take out Micro SD card from Solar Eye
■ Copy into PC files “SN YM.csv” & “ErrorLog.csv” under file directory “hist” of Micro SD
■ Open file “SN YM.csv” via Excel or OpenOffice etc

Attention: If there's any abnormity when opening the files via Excel or OpenOffice, please ensure the separator of the Excel or OpenOffice files is “,”; if not, please set into “,”.

4.9 Update software

Solar Eye can improve the performance and stability by updating software, the detailed

procedures are as below:

■Receive the latest program from www.ever-solar.com or distributors of Ever-solar;

■Read carefully announcement of the new program;

■Copy file “S-update.bin” into update folder of Micro SD, and then insert Micro SD card into Solar Eye;

■Press “left” button and power on, 3 seconds later LED blinks, it enters into upgrading state; real-time power of Solar Eye shows “P” is flashing; “P” stop flashing when upgrading finished. If it shows “F”, the upgrading fails, and please check whether all procedures are done as told. Repeat the steps after reviewing.

Attention: The following conditions can cause upgrading fail:

■Power of Solar Eye is not enough;

■SD card doesn’t exist;

■”S-update.bin” file in update folder of SD card doesn’t exist;

■The file of upgrading program is not named as “S-update”.

5. Reference:

Table 5-1 Solar Eye specifications table

Item	Specifications
Power supply	DC 4.5V/100mA or AA*3 batteries
Wireless communication range	Max. 100m
Maxim MicroSD capacity support	4GByte/FAT32 Format
Wireless Operating frequency	433MHz
Solar Eye waterproof level	IP20
Monitor the max. number of inverter	5
Max. number of connected Solar Bee	5
Currency	£, €, $ ￥
Error alarm	LCD display & audible alarm
Operating temperature range	-10~50℃
Operating humidity range	≤80%

Table 5-2 Solar Bee specifications table

Item	Specifications
Power supply	Inverter power
Wireless communication range	Max. 100m
Maxim RS485 length support	Max. 20M
Operating temperature range	-20~60℃
Max. number of connected Inverter	5
Operating humidity range	≤98%
Wireless Operating frequency	433MHz
Solar Eye waterproof level	IP65

6. Error Message

Table 6-1 Error Message(1)

Error Code	Single phase error message	Three phases error message
1	GFCI Failure	GFCI Failure
2	AC HCT Failure	AC HCT Failure
3	Reference Voltage Fault	NA
4	DC inj. differs for M-S	DC inj. differs for M-S
5	Ground I differs for M-S	Ground I differs for M-S
6	Low DC Bus	Low DC Bus
7	High DC Bus	High DC Bus
8	Device Fault	Device Fault
9	NA	NA
10	No-Utility	Grid voltage =0
11	Ground I Fault	Ground I Fault
12	NA	Output Current High Protect
13	NA	Output Current High Protect By Hardware
14	Over Temperature in Inverter	Over Temperature in Inverter
15	Auto Test	NA
16	PV Over Voltage	PV Over Voltage
17	Fan Lock	Fan Lock
18	AC Voltage Out of Range	AC Voltage Out of Range
19	Isolation Fault	Isolation Fault
20	DC Injection High	DC Injection High
21	Fac, Vac Differs for M-S	Consistent Fault: Fac, Vac Differs for M-S
22	NA	Consistent Fault
23	Fac differs for M-S	Consistent Fault: Fac differs for M-S
24	Vac differs for M-S	Consistent Fault: Vac differs for M-S
25	NA	Output Relay Check Failure
26	AC Relay-Check Fails	AC Relay-Check Fail
27	NA	Output HCT Failure
28	NA	GFCI Device Failure
29	NA	M-S Version Unmatched
30	Fac Out of Range	Fac Failure: Fac Out of Range
31	EEPROM R/W Fail	EEPROM R/W Fail
32	Communication Fails between M-S	SPI Failure: Communication Fails between M-S
33	SPI Failure: Communication Fails between M-S	
34	EEPROM R/W Fail	
35	Relay check Fail	
36	DC Injection High	
37	The result of Auto Test unction is fail	
38	DC bus is too high	
39	The voltage reference inside is abnormal	
40	AC HCT Failure	
41	GFCI Device Failure	
42	Device fault	
43	M-S version unmatched	
44--54	reserve	
55	Fac Failure: Fac Out of Range	
56	AC Voltage Out of Range	
57	Utility Loss	
58	GFCI Failure	
59	PV Over Voltage	
60	Isolation Fault	

62	Over temperature in Inverter

Table 6-1 Error Message(2)

Error Code	Single phase error message	Three phases error message
63	Consistent Fault: Vac differs for M-S	
64	Consistent Fault: Fac differs for M-S	
65	Consistent Fault: Ground I differs for M-S	
66	DC inj. differs for M-S	
67	Consistent Fault: Fac, Vac differs for M-S	
68	High DC bus	

7. Contact

If you have technical problems concerning our products, please contact us. We will get back to you as soon as possible. The contact details as below:

江苏艾索新能源股份有限公司
JIANGSU EVER-SOLAR NEW ENERGY CO.,LTD.

地址:江苏省苏州市向阳路198号9栋
邮编:215011
电话:+86 512 6937 0998
传真:+86 512 6937 0630
邮箱:service@ever-solar.com
网址:www.ever-solar.com

ADD: Building 9 No. 198 Xiangyang Road,Suzhou, China
ZIP: 215011
TEL: +86 512 6937 0998
FAX: +86 512 6937 0630
EMAIL: service@ever-solar.com
WEB: www. ever-solar.com